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MISSION REPORT IN CHINA
(from November 10th to 22th, 1991)

EEC Project
NA 85/27

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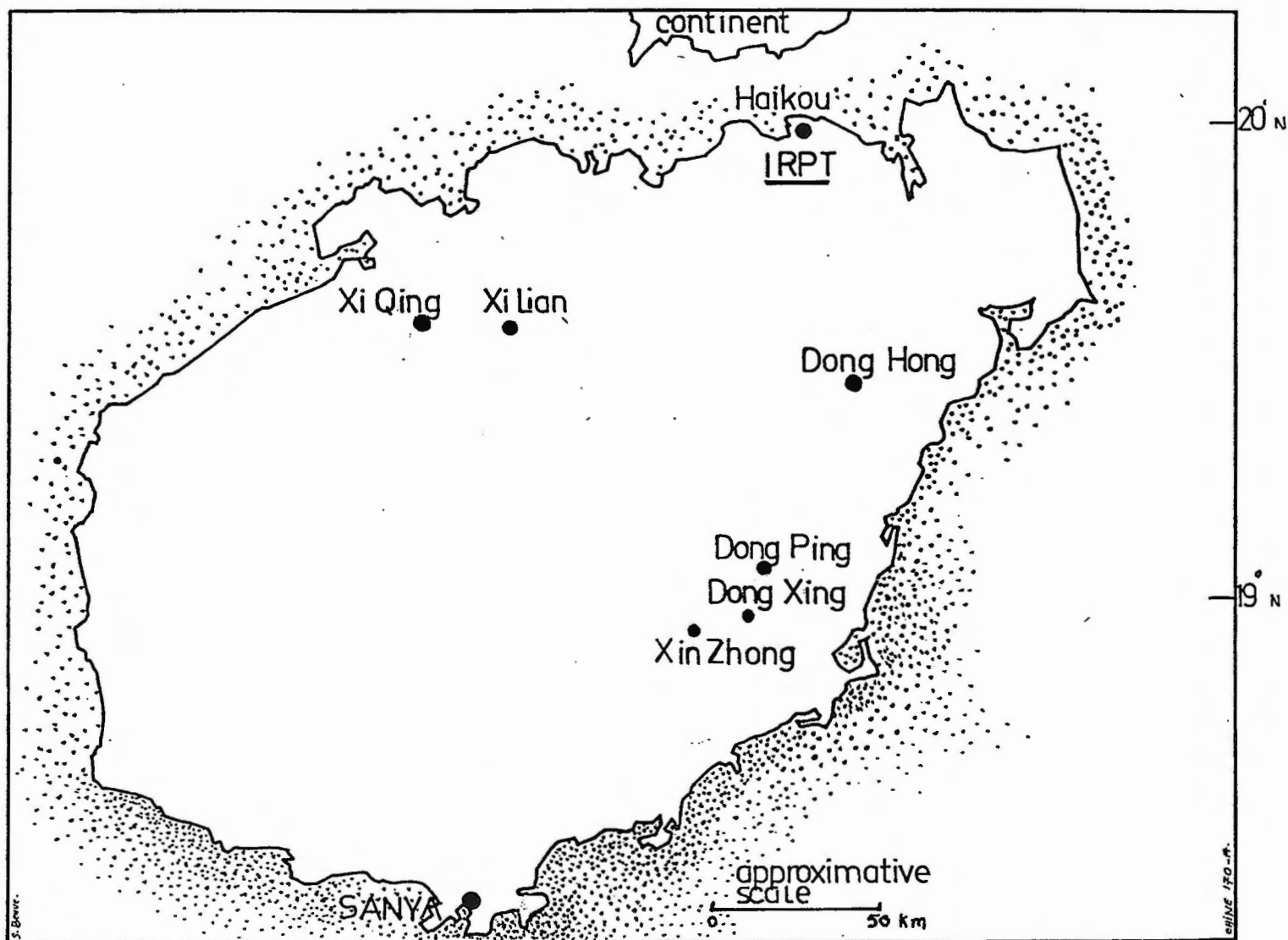
J.C. Laigneau - J. Sainte-Beuve

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ANNEX : *Pictures*

HAINAN ISLAND



MISSION SCHEDULE

- 10/11/91: Departure for Beijing on flight SR 701
- 11/11/91: Arrival in Beijing at 3:00 pm. Met by Mr. Wang Hong Xian
- 12/11/91: Meeting with Mr. Andrew Standley, Second Secretary of the Delegation of the Commission of the European Communities.
Meeting with Mr. Jorgen Delman, Co-Director of CECAT (China-Ec Centre for Agricultural Technology).
Departure for Hainan.
- 13/11/91: Meeting with Mr. Deng Xian Yuan, First Deputy Manager of IRPT, Mr. Huang Xiang Qian, Deputy Director of the IRPT, Mr. Zheng Ding Fa, English Officer: Drawing up of mission programme.
Tour of IRPT laboratory and checking of equipment supplied by the EEC.
Tour of Central Purchase Store.
Invitation to dine with Mr. Zhang Xin Zhen, Project Supervisor.
- 14/11/91: Visit to Dong Xing
Tour of factory, laboratory and plantation. Meeting with Mr. Yang Ke Ping, Deputy Director and Mr. Huang Zheng Yun, Director Engineer.
- 15/11/91: Writing up of first part of report.
- 16/11/91: Visit to Xin Zhong
Tour of laboratory and factory, accompanied by Mr. Wu Yin Bin, Head of Xin Zhong state farm and Mr. Wang Rui Qian, Director of Xin Zhong factory.
- 17/11/91: Visit to Dong Ping
Tour of laboratory and factory, accompanied by Mr. Wu Xin Zhi, Head of the Dong Ping state farm and Mr. Cai Xin Guang, Manager of Dong Ping processing factory.
- 18/11/91: Visit to Dong Hong
Tour of the laboratory and the factory, accompanied by Mr. Mai Ji Dang, Director of Dong Hong state farm and Mr. Cheng Weng Eng, Deputy Manger of processing factory.
Arrival of Mr. Standley, Second Secretary - CEC delegation.

- 19/11/91: Visit to Xi Qing
Tour of laboratory and factory, accompanied by the Vice-Director and of the factory director, Mr. Xu Chen Shuan.
- Meeting with Mr. Standley, Mr. Huang Xiang Qian, and Mr. Wang Hong Xian.
- 20/11/91: Visit to Xi Lian, return to Haikou.
- 21/11/91: Debriefing meeting with Mr. Zhang Xin Zhen, Project Supervisor, Mr. Andrew Standley, CEC representative and IRPT representatives.
- 22/11/91: Departure for Paris.

ACKNOWLEDGEMENTS

The consultants would particularly like to thank all of the project supervisors as well as the State Farms for their cooperation. Their efforts enabled us to obtain the information necessary to complete this mission. We are also grateful for the warm reception and hospitality shown to us at the various plants.

Special thanks go to the following engineers and officers :

- Mr Zhang Xin Zhen, Project Supervisor, senior engineer
- Mr Deng Xian Yuan, First Assistant Project Supervisor
- Mr Huang Xiang Qian, Deputy Director of the Tropical Crop Products Testing Station
- Mr Zheng Ding Fa, English officer
- Mr Wang Hong Hian, Project Officer, Ministry of Agriculture.

I) INTRODUCTION

Hainan Island, with a population of 6 million, covers a total area of 34,000 km², between 18° and 20° North. The southern half of the island consists of mountains (highest point: 1,867 m) and hills. The southwestern coastal zone is dry (700 mm of water/year). The southeast is affected by cyclones, whereas rainfall is better in the North, which is also relatively protected from cyclonic winds by the Wushsi mountain range.

In 1990, China consumed around 600,000 tonnes of natural rubber, 45% of which was produced in China; 70% of this production came from Hainan province, 90% of which is produced by 96 state farms and the remainder on smallholdings.

All the production is consumed locally and is mostly grade 5.

Processors, who are under the authority of the Ministry of Chemical Industries, are obliged to purchase Chinese rubber at the price fixed in consultation with the latter Ministry and the Ministry of Agriculture, before they are allowed to import any. The internal price is approximately 20% higher than the prices on the international market. This appears to be due to several factors, including:

- plentiful labour (especially retired people)
- substantial fixed charges: worker housing, hospitals, roads, schools
- low yields per hectare due to difficult economic and ecological conditions and somewhat old clones.

This situation explains a certain number of attitudes:

- Processors wish to pay the minimum price on the internal market, they are therefore now asking national producers to supply them preferably with Low grades.
- It is therefore in the interest of processors to obtain supplies from outside for high quality grades, especially 5CV. In this context of price calculation, national producers have no interest whatsoever in producing these qualities, which would cost them more, whereas they are not the masters of their selling price.

II) RUBBER TRADE IN THE HAINAN PROVINCE

II.1. Present organisation of the quality control

Standard Chinese Rubber (S.C.R.) is divided into five grades. Their specifications, in accordance with Chinese standard GB 8081-87 are listed as follows :

Characteristic	Limits				
	SCR 5L	SCR 5	SCR 10	SCR 20	SCR 50
Dirt content % max	0,05	0,05	0,10	0,20	0,50
Po min	30	30	30	30	30
PRI min	60	60	50	40	30
N content % max	0,60	0,60	0,60	0,60	0,60
V.M. % max	1,00	1,00	1,00	1,00	1,00
Ash content % max	0,60	0,60	0,75	1,00	1,50
Colour (Lovibond)	6	-	-	-	-
Colour of packing		green	brown	red	yellow

Nevertheless, we saw a new specification on a state farm, involving 5L, whose colour index amounts to 3 and the Po to 35.

IRPT has developed standard record sheets common to all the state farm laboratories for recording of analysis results. These sheets are filled in and returned to Haikou every two months. Individual results are therefore available at IRPT.

II.2) Production and price

As the prices and production figures for each farm in 1991 were not made available to us, table I shows the 1990 prices. As a comparison, table II provides information on rubber prices on the world market and on the Chinese market.

The Chinese rubber trade is controlled by the Government. Each year, a meeting, at the Central Farm Office, is held to adjust a production and a distribution programme. The greatest part of the production fixed to the state farms is allotted to the consumers at a fixed price, and the extrapart is kept free. For the private producers a programme is also determined but less constraining : about 60 % at the firm fixed price and 40 % free. The free part is generally sold at more or less 15 % above the firm price.

The following should be noted about the rubber trade in China :

- 1) The consumers require more cheap grades (10 - 20 - 30) and less SCR 5, whereas the producers want to produce as much high price grades as possible especially SCR 5 which is difficult to sell.
- 2) Since the decrease of world rubber prices, the production of SCR 5L has been practically stopped and the production of centrifuged latex greatly reduced, and many state farms have stopped their centrifuged latex lines.
- 3) Grade 5 rubber could be sold as grade 5L.

TABLE I

PRICE OF CHINESE RUBBER IN 1990 (IN YUANS)

Grades	Price per ton	Extra-cost for packing
SCR 5L	8 100	60
SCR 5	7 850	60
SCR 10	7 400	60
SCR 20	7 300	60
SCR 50	6 600	60
Centrifuged latex HA	5 504	750
Centrifuged latex LA	5 604	750
Skim 1	5 800	60
Skim 2	5 600	60
Skim 3	5 400	60
RSS 1	7 900	60
RSS 2	7 600	60
RSS 3	7 300	60
RSS 4	6 900	60
RSS 5	6 600	60
Brown Crepe 1	5 800	60
Brown Crepe 2	5 500	60
Brown Crepe 3	5 200	60
White Crepe 1X	8 600	60
White Crepe 1	8 500	60
White Crepe 2	8 400	60
White Crepe 3	8 300	60
Pale Crepe 1X	8 900	60
Pale Crepe 1	8 800	60
GPR	7 600	60
Masterbatch	7 900	60

TABLE II

PRICE OF NATURAL RUBBER IN 1988 - 1991 (per ton)

1988				1990				1991			
Exchange rate : 1 Yuan = 1.7 FF				Exchange rate : 1 Yuan = 1.15 FF				Exchange rate : 1 Yuan = 1.1 FF			
Grades	Chinese Market		International market (FF)	Chinese Market		International market (FF)	Chinese Market	Chinese Market		International market (FF)	
	U.P. Yuan	FF		U.P. Yuan	FF			U.P. Yuan	FF		
5	6 080	10 336		7 850	9 027			7 500	8 250		
10	5 795	9 851	6 392	7 400	8 510	4 150		7 000	7 700	4 395	
20	5 472	9 302	6 308	7 300	8 395	4 117				4 372	
Dry latex	9 200	15 640	£ 1 354,7	9 250	10 637						

II.3) Storage in Kaikou

All the production on the island is stored at Haikou. We visited the latex concentrate store, but unfortunately not the quality control laboratory, which checks DRC and mechanical stability, at the rate of one sample for 4 tonnes of latex, i.e. for a tanker. This store does not carry out adjustment, but does produce blends.

Sixteen 100-tonne, totally tiled latex tanks are fitted with 3 stirrers each. Each tank is cleaned after every 10 drain-offs. The store is virtually empty today and latex is usually stored for at least 2 weeks. All the shipments to the continent are in 200 litre drums. Production in 1990 can be estimated at between 3,000 and 4,000 tonnes of latex.

III) VISIT TO IRPT

III.1) Tour of the laboratory

The laboratory equipment supplied by EEC project NA85/27 was checked:

- 1 MK III plastimeter, No. C89016/20 in working order, with its steam generator (No. C89027/8). On the day of our visit, this apparatus was not operating, but would be used for any analyses overload that the existing equipment could not cope with (MK 2 plastimeter).
- 1 PRI oven, No. C89041/6 in working order. Same comments as above.
- 1 KLAXON stabilometer, No. 57096. This equipment has certain secondary defects which do not prevent the machine from working properly:
 - * rack immobilization screw blocked,
 - * there is a "sparking" phenomenon in the electric motor, due to wear on the carbons and the collector reach.

Arrangements should be made for the supplier to rectify these minor problems (see Section V: Recommendations).

Another stabilometer, without the above defects, is used for the necessary analyses.

- 1 Lovibond colorimeter in its original packaging.

The operating manual is not precise enough and requires additional explanations from the manufacturer, who will be contacted (see Section V: Recommendations).

- 1 Fontjine TP 400 press, No. 96 057 09 89/TPB 246 in working order, used to prepare colour test-pieces (see Section V: Recommendations).
- 1 Fontjine TP 600 press, No. 96 058 09 89/TPC 241 in working order, used to vulcanize samples intended for the measurement of mechanical properties (see Section V: Recommendations).

- 1 MK III plastimeter, No. C89040/8 with steam generator. At the time of our visit, this equipment was in perfect working order. However, the people using it told us that occasionally, force was not applied after the standardized 15 seconds. The Wallace company will be contacted about this (see Section V: Recommendations).
- 1 Wallace PRI oven, No. C89041/14 in working order.
- 1 Westfalia laboratory centrifuge, No. 1697 724 in working order and checked by Mr. Lemoine (see Section V: Recommendations).
- 1 Wallace plastimeter, No. C89040/3, with steam generator, No. C89027/5. During our visit, this equipment was in perfect working order, but the people using it told us that occasionally force was not applied after the standardized 15 seconds. The Wallace company will be contacted about this (see Section V: Recommendations).
- 1 Wallace PRI oven, No. C89041/9 in working order.
- 12 BOSCH AE 200 scales, 3 of which had been unpacked at the time of our visit:
 - * No. 2009051 has an initial display fault
 - * No. 2009050 appears to be faultless
 - * No. 2009041 reveals read-off instability.

Whatever the condition of these balances, we find it difficult to test them effectively in the existing surroundings (in particular, faulty electricity supply). We asked for them to be tested again in an air-conditioned room with no draughts and a stabilized electricity supply.

During our second visit, we noted that the 3 balances were unable to stabilize themselves when connected up to an thyatron inverter. A fourth had a worrying tendency to overheat at the back.

IV. VISIT TO THE STATE FARMS

IV.1) DONG XING

Manager: Yang Ke Ping
 Factory Director: Huang Zheng Yun
 Concession: 7,300 ha
 Area planted with *hevea*: 4,700 ha
 Area being tapped: 3,300 ha
 1990 Production: 2,100 tonnes
 Estimated production for 1991: 2,300 tonnes

* Clones

The plantation is mainly composed of old seedlings, RRIM 600, PR107 and HK1, Hainan clone of the 1960s.

* Cropping system

Tapping begins in mid-April, ending around 15th December. The trees are tapped in S2,D/2, which corresponds to 120 tappings per year. Stimulation is carried out twice a month, but only once a month when relative humidity is low.

* In 1990, 19% of the planted area seems to have been destroyed by 4 typhoons.

* Mean yields at the plantation seem to be around 0.6 t/ha/yr; however, it should be pointed out that *hevea* is included in a multiple cropping system mainly including tea and, secondarily, pineapple, pepper and coconut. Nevertheless, planting density is around 500 trees per hectare; *hevea* is considered here more as an intercrop for tea than as a crop in its own right. The new tea and *hevea* plots produce 1.2 t of rubber per hectare per year. According to those in charge, separate *hevea* plots would produce 1.4 t of rubber/ha/year with the same clones.

A) Quality of the rubber produced

In 1990, the factory produced 1,400 tonnes of centrifuged latex and 400 tonnes of SCR 5.

B) Concentrated latex line

During our visit, this line was not operating and could therefore not be visited. The quota for the current year has already been produced. It was pointed out to us that China has lost the American market for medical and housework gloves, apparently because the goods supplied did not comply with American standards. The island's glove production lines consequently came to a halt, hence there was a reduction concentrated latex consumption.

C) Latex line

The latex arriving at the factory is preserved at a rate of 0.005% of NH₃ and is filtered to remove impurities (> 40 mesh).

It is diluted to 20% in three 10 m³ homogenization tanks. It is acidified with acetic acid in a matched flow system, at a rate of 15 g of acid per dry kg; it is then poured into aluminium troughs where the pH is checked with a coloured indicator, into which a solution of sodium bisulphite is sprayed. Coagulation takes around 20 minutes, and foam is kept down by an aluminium roller. After maturing for 8 hours, the coagulum moves on to the crusher, then through three crepers in series (roller diameter: 200 mm) and creper-hammermill. The crumb is dried in 6 two-tier trolleys containing 4 to 500 kg of dry rubber for 4 hours at 115/120°C. Heavy fuel consumption appears to be 30 kg per tonne.

Packaging conditions are clean, the colour is that of a good 5L, though there are sometimes black spots, probably from the dryer. The 40 kg bales are pressed for 30 seconds at 100 tonnes, then wrapped in a polyethylene bag and double, hand sewn, (see Section V, Recommendations).

D) Secondary grade line

We were unable to visit the SG line, which is mainly composed of washers and crepers; cup lumps and tree scrap soak in the same tank for 4 to 5 hours before being processed. Secondary Grade rubber is either in crepe form, or in 40 kg bales.

E) Laboratory

The existing laboratory currently only analyzes centrifuged latex; a construction project is currently under way for a new laboratory to analyze dry rubber, which should be ready at the end of 1992.

The analyses carried out are as follows:

- Total solid content (TSC)
- Dry rubber content (DRC)
- Ammonia content (NH₃ %)
- Mechanical stability (MST)
- Volatile fatty acid (VFA)
- Colour index
- Odour

It should be noted that the potassium index is not measured. These analyses are carried out on the finished product, taking one mean sample for 40 t of latex, i.e. given their production, 30 analyses per year; the remainder of the laboratory's operations as regards latex involve production checks at unknown frequencies. The main operation is basically tapper DRC measurement, using two automatic instruments manufactured in China, at a rate of 300 measurements/hour/instrument.

Project equipment:

- 1 Klaxon stabilometer (No. 57096) in working order, tallying well with the old one.
- 1 Bosch AE200 balance (No. 2009044) sent back to Haikou as it was out of order.
- 1 Bosch PE618 balance (No. 189397) with a faulty on/off switch. The supplier will be contacted to put this right. (See Section V: Recommendations).
- 1 Knick pH-metre (No. 620982) in working order and used for other purposes.
- 1 air-conditioner (No. U7433 0606) in working order and being used.
- 1 Wallace plastimeter (C89016/16), with steam generator (No. C89027/1) in their original packaging. This equipment has not been used yet.
- 1 Wallace PRI oven (No. C89041/2) in its original packaging. This equipment has not been used yet.

All dry rubber analyses at IRPT are carried out on one mean sample for 20 tonnes taken at random from 5% of bales (around 5).

IV.2.) XIN ZHONG

Manager of the state farm: Wu Yin Bin
Factory director: Wang Rui Quian
Concession: 6000 ha
Area planted with *hevea*: 5,350 ha
Area being tapped: 4,000 ha
Production in 1990: 3,700 tonnes
Estimated production for 1991: 4,000 tonnes

* Clones

The plantation is mainly composed of old seedlings, and of PR107. Tree age is very heterogeneous; the oldest plantings date from 1960 and planting was staggered up to 1980. Today, the concession is planted in its entirety and the old seedlings have been replaced by budded planting material.

* Cropping system

Tapping begins in April and ends in December. The trees are tapped in S4,D/3, which corresponds to 80 tappings per year. Stimulation is carried out twice a month, but only once a month if the relative humidity is low.

A tapping task involves 400 trees per tapper, for a monthly salary of 160 Yuans.

* In 1990, 200,000 trees, i.e. around 500 ha appear to have been destroyed by a typhoon, but 50% will be recoverable.

* Average yields at the plantation seem to be around 1 t/ha/year; however, it should be pointed out that *hevea* is grown on terraces. Nevertheless, planting density appears to be around 560 trees per hectare.

* Management

This plantation employs 9,000 active staff out of a total population of 16,000, including 2,000 retired people costing 4 million Yuans per year to the community, i.e. 18% of total wage funds.

A) Quality of the rubber produced

90% of the production at this plantation is 5L, i.e. 3,000 tonnes. This situation would appear to be caused by the combination of 2 factors linked to climate: relatively short flow from the tree (stops around 1:00 pm) and good latex stability in the cup.

Sampling and checking are carried out in accordance with ministerial standards. Sampling involves one bale corner (the last in the batch) per tonne of dry rubber, which corresponds to 18 samples per day on average. For certain analyses, this laboratory is under-equipped, especially for ash; we feel it would be wise to acquire additional equipment to balance out the work stations (see Section V: Recommendations).

B) Latex line

The latex arriving at the factory is preserved at a rate of 0.05% NH₃ and is filtered to remove impurities (> 40 mesh).

It is diluted to 23% in three homogenization tanks with well designed stirrers. It is acidified with acetic acid in a matched flow system at a rate of 11 g of pure acid per dry kg in the form of a 2% dilution; it is then poured into aluminium troughs, into which a sodium bisulphite solution is sprayed. After maturing for 12 hours, the coagulum goes into a crusher, then through 3 crepers in series (roller diameter: 200 mm) and a creper-hammermill. The crumb is dried in 6 two-tier trolleys containing 500 kg of dry rubber for 4 hours at 115/120°C. Heavy fuel consumption is apparently 32 kg per tonne.

Packaging conditions are clean and the colour is that of a good 5L, though there are a few black spots, probably from the dryer. The 40 kg bales are pressed for a maximum of 60 seconds at 100 tonnes, wrapped in a polyethylene bag and double wrapped in a woven polypropylene bag, hand sewn (see Section V: Recommendations).

C) Secondary Grade Line

Cup lumps and tree scrap are soaked in the same tank for 2 to 3 days prior to processing. The line comprises a washer and 2 crepers 200 mm in diameter with different groove depths, through which the rubber is passed 2 x 6 times. The resulting crepes then go on to the latex line after the crusher. The crumb is laid in single layers in dryers and dried at 110-115°C for 4 hours, which doubles fuel consumption compared to latex, i.e. 64 kg of heavy fuel for a tonne of dry rubber. The rubber is then removed from the mould; it should be noted that the very regular shapes of the cakes, which are all cut by hand length-wise for checking before pressing without prior cooling. Once the bales have been wrapped, they are stored in bulk in a storeroom that is kept spotless.

D) Laboratory

The laboratory consists of two rooms, one of which is air-conditioned for the balances and the plastimeter, which is out of order. The other room is spacious and clean and contains the roller mixer, the project plastimeter and the rest of the equipment. (see Section V: Recommendations).

The analyses carried out are as follows:

- * Dirt content
- * Ash content
- * Volatile substances content
- * Po
- * PRI

Nitrogen quantification is not carried out systematically and colour is not determined.

- Project equipment:

- + 1 Bosch AE200 balance (No. 2009043), sent back to Haikou as it was out of order.
- + 1 Bosch PE618 balance (No. 189393), in working order.
- + 1 Knick pH meter (No. 647356), in working order and little used simply for reasons of convenience (see Section V: Recommendations).
- + 1 air-conditioner (No. U7433 0607), in working order and operating.
- + 1 Wallace plastimeter (C89027/4) with steam generator (No. C89027/4), operating but with the following faults:
 - . calibration zero drift
 - . pressure gauge does not return to zero.
- + 1 Wallace PRI oven (No. C89041/5) in working order, but an indicator light bulb (in stock) needs changing (see Section V: Recommendations).

We also saw a Wallace MK II plastimeter (funded by the World Bank) which was out of order and a roller mixer for homogenization (6 cold passes with no friction and a gap of 0.6 to 0.8 mm).

IV.3) DONG PING

Manager of the state farm: Wu Xin Zhi

Factory Director: Cai Xin Guang

Concession: 12,000 ha

Area planted with *hevea*: 3,730 ha

Area being tapped: 1,240 ha

1990 production: 2,026 tonnes

Estimated production for 1991: 2,000 tonnes

Estimated production for 1992: 2,500 tonnes

* Clones

The plantation is made up of young trees, mainly PR107, RRIM 600 and PB86. All the plantings prior to 1976 have been rejuvenated with budded material and there are no more seedlings.

* Cropping system

Tapping starts at the beginning of April and finishes at the end of December. The trees are tapped in S2,D/2, which corresponds to 135 tappings per year. Stimulation is carried out twice a month, but only once a month if relative humidity is low. The stimulant used is a simple aqueous solution with 2% ethylene gas. ETHREL seems to be unknown on the state farms.

* In 1991, 200,000 trees, i.e. around 355 ha appear to have been destroyed in 1 typhoon; around 50% will be recoverable, amounting to production losses of 300 tonnes.

* Mean yields at the plantation would seem to be around 1,600 kg/ha/yr and planting density 560 trees/hectare.

* Management

This plantation employs 7,000 staff for a total population of 11,000.

A) Quality of the rubber produced

91% of the production on this plantation is 5L, i.e. 1,843 tonnes. This situation would appear to stem from the combination of 2 factors linked to climate: temperature and humidity. In the Summer, trees are tapped at 3:00 am and collection takes place at 9:00 am, flow having already stopped. In Winter, the trees are tapped at 6:00 am and collection takes place at 11:00 am and at 4:00 pm if necessary, flow having already stopped.

Sampling and checking are in compliance with ministerial standards. Sampling involves six times two corners of the same bale for 20 tonnes of grade 5 rubber and 13 times two corners from the same bale for 5 tonnes of grade 10 rubber (see Section V: Recommendations). Concurrently, three samples, each comprising 6 corners from grade 5 bales and one sample comprising 6 corners from grade 10 bales are sent each month to IRPT Haikou for analysis.

B) Latex line

The latex arriving at the factory is preserved at a rate of 0.03 to 0.05% NH₃ and is filtered to remove impurities (>40 mesh). It is diluted to 23% in two homogenization tanks. It is acidified with acetic acid in a matched flow system at a rate of 6 g of pure acid per kg of dry rubber in the form of a 2% dilution; it is then poured into aluminium troughs, into which a sodium bisulphite solution is sprayed. After maturing for 12 hours, the coagulum goes to a crusher, then through three crepers in series (roller diameter: 200 mm) and a creper-hammer mill. The crumb is dried in 6 two-tier trolleys containing 500 kg of dry rubber for 4 hours at 110°C. Heavy fuel consumption is apparently 30 kg per tonne.

Packaging conditions are clean and the colour is that of a good 5L, though with a few black specks probably from the dryer. The 40 kg bales are pressed for a maximum of 15 seconds at 100 tonnes, then wrapped in a polyethylene bag and double-wrapped in a woven polypropylene bag, hand sewn (see Section V: Recommendations).

C) Secondary grade line

Cup lumps and tree scrap are soaked in the same tank for 1 to 2 days prior to processing. The line includes a washer and 2 crepers, 200 mm in diameter with different groove depths through which the rubber is passed 2 x 6 times. The resulting crepes go to the latex line after the crusher. The crumb is placed in single layers in the dryers and dried at 105°C for 4 hours, which doubles fuel consumption compared to latex, i.e. 60 kg of heavy fuel for a tonne of dry rubber. The rubber is then removed from the mould; it is worth noting the very regular shape of the cakes, which are cut by hand length-wise to check before pressing without prior cooling. Once the bales have been wrapped, they are stored in bulk in a storeroom that is kept spotless.

D) Laboratory

The laboratory consists of 3 rooms, one of which is air-conditioned for the balances and plastimeter. The other rooms are spacious and clean and contain roller mixers and the rest of the equipment (see Section V: Recommendations):

The analyses carried out are the following:

- * Impurities content : on each sample
 - * Ash content: on every third sample
 - * Amount of volatile matter: on each sample
 - * Amount of nitrogen: every third sample
 - * Po : on each sample
 - * PRI: on each sample
- The colour is not determined.

- Project equipment:

- * 1 Bosch AE200 balance (No. 2009042), sent back to Haikou as it was out of order.
- * A Bosch PE618 balance (No. 189391), in working order.
- * A Knick pH meter (No. 647341), in working order and little used just for reasons of convenience (see Section V: Recommendations).
- * 1 air-conditioner (No. U7433 0600), in working order and operating.
- * 1 Wallace plastimeter (C89010/1) with steam generator (No. C89027/6), operating, but:
the pressure gauge is faulty and we took advantage of the situation to give this laboratory the spare parts needed to repair the plastimeter, as well as those forgotten in the initial order. These included:
 - A steam pressure gauge
 - A simmerstat controller
 - A cut-out thermostat
 - A sight glass
 - A set of seals
- * 1 Wallace PRI oven (No. C89041/7), in working order. We saw a roller mixer for homogenization (six cold passes without friction, with a gap of 1.5 mm).

IV.4) DONG HONG

Manager of the state farm: Mai Ji Dang
Manager of the processing factory: Li Shun Mai
Concession: 8,000 ha
Area planted with *hevea*: 3,200 ha
Area being tapped: 1,330 ha
1990 Production: 1,182 tonnes

Heavy fuel consumption is apparently 30 kg per tonne. This brand new dryer with a throughput of 1.5 tonnes/hour has the particular feature of working virtually in an open loop, i.e. a fan returns fresh air into the combustion gas, and the moist air extraction flue (without an extractor fan) is located outside the building. We noticed the difference in fan size between the wet part and the dry part. In addition, these fans are equipped with diaphragms, so that air speed can be varied. Finally, the trolleys are loaded with very high loads of crumb; there are 4 PVC vents at the bottom of the trolley to create preferential air currents; at the end of drying the crumb cakes are over 50 cm thick. Packing conditions are clean and the colour is that of a good 5L, though with a few black spots, probably from the dryer. The cakes are cut in two length-wise before being pressed for 1 minute at 150 tonnes, in the form of 40 kg bales, then packed in a polyethylene bag and double wrapped in a woven polypropylene bag, machine sewn (see Section V: Recommendations).

C) Low grades line

We did not visit this line.

D) Laboratory

The laboratory comprises three rooms, one of which is entirely new and air-conditioned and even has aluminium window and door frames. A second room is kept exclusively for the mixer on which sample homogenization is carried out in six cold passes with a 0.3 mm gap and no friction. The remainder of the equipment is in the third room, which is bright, spacious and clean.

The analyses carried out are the following:

- * Impurities content
- * Ash content
- * Amount of volatile matter
- * Nitrogen quantification
- * Po
- * PRI

The colour is not determined.

We noted that the operating manuals for the following equipment had been translated into Chinese:

- * MK III plastimeter
- * Wallace oven for PRI measurement
- * Bosch balances
- * Knick pH meter
- * Klaxon stabilometer.

In addition, a procedures handbook drawn up by SCATC is available in each laboratory.

Project equipment:

- 1 Bosch AE200 balance (No. 2009041), sent back to Haikou as it was out of order.
- 1 Bosch PE618 balance (No. 189407), in working order.

- 1 Knick pH meter (No. 620953), in working order and little used for reasons of convenience (see Section V: Recommendations)
- 1 air-conditioner, in working order and operating
- 1 Wallace plastimeter (C89040/18) with steam generator (No. C89027/3), in working order
- 1 Wallace PRI oven (No. C89041/4) in working order.

IV.5) XI QIN

Manager of the state farm: Wei Shui Qin

Manager of the processing factory: Xu Chen Shuan

Concession: 7,550 ha

Area planted with *hevea*: 4,900 ha

Area being tapped: 3,100 ha

1990 production: 2,263 tonnes.

* Clones

The plantation is made up of old seedlings (60%) and young budded material, mainly PR107.

* Cropping system

Tapping begins in mid-April and ends in mid-December.

The trees are tapped in S2,D/2, which corresponds to 120 tappings per year. Stimulation is carried out twelve times a year with an ethylene generating product at 2% active ingredient. In 1991, 300,000 trees, i.e. around 600 ha were apparently destroyed by 3 typhoons; in theory, 70-80% will be recoverable.

* The average yields at the plantation would seem to be 730 kg/ha/year and planting density 560 trees per hectare.

* Management

This plantation employs 9,000 active people for a total population of 20,000.

A) Quality of the rubber produced

92% of the production on this plantation is 5L, i.e. 2082 tonnes. This situation would seem to be due to the combination of 2 factors linked to climate: temperature and humidity.

Sampling and checking are carried out in compliance with ministerial standards. Sampling involves ten bale corners for 20 tonnes of grade 5 rubber and 5 tonnes of grade 10 rubber (see Section V: Recommendations). Part of each sample is sent to IRPT for analysis.

B) Latex line

The latex arriving at the factory is preserved at a rate of 0.04% NH_3 and is filtered by clarification to remove impurities and pre-coagula.

It is diluted to 22% in two homogenization tanks, then acidified with acetic acid in a matched flow system at a rate of 10 g of pure acid per kg of dry rubber in the form of a 3–4% dilution. It is then poured into very long aluminium troughs (75 m), into which a sodium bisulphite solution is sprayed. At the time of our visit, the line was not operating and we were unable to see the mechanical processing of the coagulum. Crumb is dried for 4 hours at 115°C for grade 5 qualities and 3½ hours at 110°C for grade 10 qualities. Fuel consumption amounts to 30 kg of heavy fuel per tonne of rubber. The dryer has the particular feature of working virtually in an open loop, i.e. a fan has been added to return fresh air to the combustion gases. Finally, the trolleys are loaded with very thick layers of crumb; there are 4 PVC vents at the bottom of the trolleys to create preferential air currents; the crumb cakes at the end of drying are over 50 cm thick. Packaging conditions are clean. The cakes are cut in two length-wise before being pressed for 1 minute at 150 tonnes in the form of 40 kg bales, then packed in a polyethylene bag and double wrapped in a woven polypropylene bag, machine sewn (see Section V, Recommendations).

C) Low grades line

Cup lumps and tree scrap are mixed in a tank of water and left to soak for 7 days. They are fed into a washer and three crepers, then pass to the latex line.

D) Laboratory

The laboratory comprises three rooms, one of which is entirely new and air-conditioned; a second room is kept exclusively for the mixer used for sample homogenization with 6 cold passes, a gap of 0.33 mm and no friction. The remainder of the equipment is in the third room, which is light, spacious and clean.

The analyses carried out are the following:

- * Impurities content
- * Ash content
- * Amount of volatile matters
- * Nitrogen quantification
- * Po
- * PRI

The colour is not determined. All the analyses are carried out on each sample, apart from nitrogen quantification and ash content, which are carried out on every third sample.

- Project equipment:

- * 1 Bosch AE200 balance (No. 2009048), sent back to Haikou as it was out of order
- * 1 Bosch PE618 balance (No. 189408), out of order (see Section V: Recommendations)

- * 1 Knick pH meter (No. 647357), in working order and little used for simple reasons of convenience (see Section V: Recommendations)
- * 1 air-conditioner (No. U7433 0609), in working order and operating
- * 1 Wallace plastimeter (C89040/1) with steam generator (No. C89027/10) in working order.
- * 1 Wallace PRI oven (No. C89041/11) in working order.

IV.6) XI LIAN

Manager of the state farm: Fan Xi Guang

Factory director: Mrs. Li Lan Gui

Concession: 10,500 ha

Area planted with *hevea*: 4,800 ha

Area being tapped: 3,600 ha i.e. 1,200,000 trees

1990 production: 3,200 tonnes

Estimated production for 1991: 3,000 tonnes

This farm was set up in 1952 and is based primarily on *hevea* growing.

* Clones

The plantation is made up of 50% seedlings planted from 1952 to 1953, the rest being RRIM 600, PR 107 and 5% Chinese clones currently being assessed. The old seedlings are currently being rejuvenated.

* Cropping system

Tapping starts at the beginning of April and finishes at the end of November. The old trees are tapped in S2,D/2 and stimulated, which corresponds to 120 tappings a year. The young trees are tapped using two methods, S2,D/2, without stimulation, or S2,D/3 with stimulation. The crops to be rejuvenated are upwardly and downwardly tapped to death; stimulation is carried out twelve times a year. The stimulating product is a simple aqueous solution with 2% ethylene generating active ingredient. ETHREL seems to be unknown on the state farms.

* In 1991, 240,000 trees, which corresponds to around 720 ha, were apparently destroyed by 2 typhoons, which seems exceptional in this part of the islands; around 40% will be recoverable.

* Mean yields at the plantation seem to be around 890 kg/ha/year, with a planting density of around 560 trees/ha.

* Management

This plantation employs 8,000 active staff for a total population of 16,000 in 55 villages.

A) Quality of the rubber produced

90% of the production on this plantation is concentrated latex. This situation is due to the combination of 2 factors linked to climate: temperature and humidity. Sampling involves three or four samples for 60 tonnes of concentrated latex and one sample for four tonnes made up of four homogenized bale corners for secondary grade rubber (see Section V: Recommendations).

B) Concentrated latex line

The latex is preserved with ammonia at collection centres. An additional quantity of this product is added if necessary to reach a rate of 0.2 to 0.25% before centrifugation. The latex is then diluted to a rate of 28-30%. VFA determination is no longer carried out and zinc and DTMT are no longer added during manufacture. The latex is stored from 4 hours to 4 days before centrifugation. It is not necessary to use diammonium phosphate as the soil does not contain much magnesium. The latex is filtered through a 60 mesh sieve before centrifugation. Centrifugation is carried out using 8 centrifuges: 4 Alpha Laval 410 centrifuges and 4 of Chinese manufacture. The latex is kept in 5 tiled tanks for 8-10 days after the ammonia rate has been adjusted to 0.76%. The MST is adjusted if necessary by adding soap.

C) Skim processing line

The skim is stored in a tiled tank for 4 days; this tank is fitted with a natural-draw flue for ammonia elimination. The skim is then transferred to a tank, then poured into troughs and acidified by a matched flow system with sulphuric acid at a rate of 100 to 120 kg per tonne of dry rubber. The coagulum is cut by hand, then processed on a creper followed by an extruder before being dried.

D) Laboratory

The laboratory comprises 3 rooms, one of which is air-conditioned for the balances and the plastimeter. The roller mixer and the remainder of the equipment can be found in the other two rooms, which are bright, spacious and clean (see Section V: Recommendations). The analyses carried out are as follows:

- centrifuged latex

- * dry rubber content
- * dry extract
- * volatile fatty acid content
- * mechanical stability
- * ammonia content

Samples are sent to IRPT, where they undergo determination:

- * potassium index
- * sediment content
- * copper rate
- * manganese rate

The precoagulum content is not determined.

- dry rubber (primarily skim)

Only the impurities content is determined, the rest is carried out by IRPT.

- Project equipment

- * 1 Bosch AE200 balance (No. 2009046), sent back to Haikou as it was out of order.
- * 1 Bosch PE618 balance (No. 189396) in working order
- * 1 Knick pH meter (No. 620943) in working order, and seems to be used regularly
- * 1 air-conditioner (No. U7433 0601), in working order and operational.
- * 1 Wallace plastimeter (C89040/2) with steam generator (C89027/7), which is operating but there is an intermittent defect as regards triggering of force application after 15 seconds (see Section V: Recommendations).

We took advantage of this occasion to provide this laboratory with the spare parts missing, namely:

- a PCB timer C/WLCD Display, WM1200-3

- * 1 Wallace PRI oven (No. C89041/8) in working order
- * 1 Klaxon stabilometer No. 57906 in working order.

We saw a roller mixer for homogenization (6 cold passes, without friction and with a gap of 1.65 mm).

V) RECOMMENDATIONS

V.1) Equipment

V.1.1. *Arrangements for existing equipment*

Certain instruments should be used in air-conditioned premises. This mostly concerns equipment with electronic components, for example: the MK III plastimeter at Xing Zhong.

Other items of equipment have components which produce heat, thereby affecting air-conditioning, for example the Fontjine presses at IRPT.

Finally, certain heavy machines cause vibrations that are detrimental for precision instruments and should be installed in separate areas, for example: the roller mixer at Xin Zhong.

V.1.2. *Maintenance of existing equipment*

V.1.2.1. Repairs

We noted certain faults or breakdowns on a certain number of instruments, particularly:

IRPT - Haikou

Klaxon stabilometer - rack and motor

Lovibond comparator - operating procedure

Wallace plastimeter: checking of timer

DONG XIN

Bosch PE618 balance: on/off switch

XIN ZHONG

PRI oven - indicator lamp

XI QING

Bosch PE618 balance No. 189408, out of order

XI LIAN

Wallace plastimeter does not trigger systematically after 15 seconds.

The particular problem with the Bosch balances will be solved in consultation with the different parties.

V.1.2.2. Maintenance

Future missions should take into account the training of staff assigned to laboratory equipment maintenance and repair.

V.1.3. New equipment

As far as the ISO sampling plan is concerned, certain laboratories are under-equipped for certain analyses, for example, the impurities rate at Xin Zhong.

V.1.4. Electrical power

Laboratory equipment with electronic components work at low voltage and require the earth as a reference voltage. We feel it is important to check that all the laboratory equipment is earthed.

V.1.5. Data processing hardware

We noted that the computer was not being used and that the hard disk has had to be reformatted; the floppy disks are exposed to dust; future experts will have to find a solution to this problem.

We checked that software utilization manuals were available in English and, unfortunately, we noted that there was no documentation for the operation and data processing system. These documents will be needed if the mission by the IRPT data processing expert is to be a success.

V.2) Processing

V.2.1. Latex line

According to certain processors, Chinese rubbers have a different modulus from other rubbers; this needs to be confirmed through comparative analysis. It should be remembered, however, that the modulus of a top quality rubber is primarily based on the coagulation pH, and the fact of adding a constant quantity of acid does not guarantee the consistency of the modulus, especially when the latex is preserved with ammonia.

V.2.2. Secondary grade line

The secondary grade lines could be improved; given the small amounts produced, we do not feel this is a priority problem.

V.2.3. Drying and packing

We noted the excellent performance of the dryers. However, the few black spots seen in the grade 5 qualities could come from an accidental close-down of the burner. It would be wise to find a device that would prevent this phenomenon for 5L grades.

Certain polyethylene qualities disperse easily in processing mixers, unlike polypropylene; hence, if possible, polypropylene should be reserved exclusively for double wrapping, taking all the necessary precautions to prevent fibres making their way into the bales.

V.3) Quality awareness and checking

V.3.1. *Crumb*

We noted that the quality notion has been widely developed on the state farms we visited and we also noted that a new laboratory was being built at Dong Xin. However, knowledge and a mastery of quality requires:

- analysis of the existing results using computerized statistical methods
- checking of result validity through inter-laboratory tests
- definition and standardization of the batch concept between state farms
- standardized sampling. We noted that batch sampling on certain state farms involved mixing several samples taken from different bales; of course, this way of proceeding does not alter the mean values obtained, but it does lead to a substantial loss in information about the dispersion of properties. In addition, the analysis procedures for homogenization need to be reviewed.

V.3.2. *Centrifuged rubber*

Staff need to be trained and made aware of centrifugation problems when using the Westfalia centrifuge. Improvement of latex bulk storage.

VI) SCHEDULE OF FUTURE MISSIONS

In view of the recommendations given in section V, we feel that the last technical assistance missions should concentrate on the following points:

1) BOSCH BALANCES

Negotiations with the EEC in Brussels, SIEMSEN and BOSCH, for a technician to come and repair all the Bosch AE200 balances at IRPT.

2) SAMPLE ANALYSIS

Analysis in our laboratories of the samples taken at the different factories, to check technological properties, especially the 100% modulus. The analyses envisaged are: Po, PRI, VM, Rheogram, 100% modulus in ACS1 blend (ASTM compound standard No.1) on ring test-pieces - H2 - H3 (IRTP uses H2 test pieces - to be confirmed) - elasticity and die swell measurement - gelling rate and resistance - drawing up of a report - recommendations.

Period: end of January 1992

Cost: more than one week

3) PREPARATION OF THE FIRST MISSION

* Visit to Wallace - spare parts - maintenance, assembly and reassembly manual - loan of a MK III plastimeter for staff training.

Period: 2 weeks in March 1992

Cost: 0.5 man-months

4) FIRST MISSION TO CHINA

- * Training of two engineers, one of whom Mr. Huang Xiang Qian, to use the microcomputer and printer along with the following software: Word 4, Lotus, Dbase III, Statgraphics, and different utilities.
- * Tour round the 10 project laboratories
- * Checking operation of project equipment and repair if necessary (see Section V: Recommendations).
- * Assessment of the analysis capabilities, as per ISO standard 2000: impurities content, ash content, volatile matter content, nitrogen quantification, Po and PRI in each laboratory.
- * Drawing up of a list of laboratory equipment (glassware, oven, etc.) for additional equipment making it possible to optimize the analysis stations, so as to respect the specifications of ISO standard 2000.
- * Laboratory staff training for project equipment maintenance and repair.

This part of the mission will mainly concentrate on troubleshooting methodology and any equipment overhaul. This will involve training for technicians in diagnosis, dismantling and re-assembly (a maximum of 5, in sessions) for the Wallace MK III plastimeter in the IRPT laboratories.

Experts: Mr. Touron for 2 months and Mr. Hervieu, a computer expert, for a fortnight.

Period: 15th April-15th June

Cost : 2.5 man-months

5) SECOND MISSION TO CHINA

- * training of a technician in data inputting for the analysis results from the 10 laboratories.
- * statistical analysis of computerized results.
- * signification and validation of analysis results
- * design and organization of a trial network between the 10 IRPT laboratories, to enable reproducibility and repeatability assessment.
- * possible sampling and method standardization, for example: homogenization.

Expert: Mr. Touron

Period: August - September

Cost: 2 man-month

6) THIRD MISSION TO CHINA

- * implementation of recommendations as regards modulus improvement (see Section I).

This will require Chinese partners to make a processing line available for tests.

Expert: Mr. Piton

Period: September

Cost: 1 man-month

7) FOURTH MISSION TO CHINA

* Summing up and conclusion

Experts: Messrs. Laigneau and Sainte-Beuve

Period: September

Cost: 1 man-month

Recap table No. III indicates the technical assistance missions to be carried out up to the end of the project, along with a corresponding budget forecast.

TABLE III

TECHNICAL ASSISTANCE MISSIONS

	Localisation	Period	Estimate price ECUS
I. Bosch balances	China	ASAP	-
II. Sample analysis	France	January 1992	2 500
III. Preparation of the mission Visit to Wallace Cie	France England	March 1992 2 weeks	4 000
IV. Training in software Visit of 10 laboratories Training to repair Wallace plastimeter	China	April - May 1992 2,5 months	30 000
V. Statistical analysis of the results Interlaboratory trials Analysis of interlab. trials	China France	August - Septem. 1992 2 months	26 000
VI. Trials to improve modulus	Chine	September 1992 1 month	15 000
VII. Recommandations and conclusion	Chine	November 1992 2 x 0.5 month	20 000
TOTAL			100 000

VII. BUDGET

At Mr. Standley's request a financial balance to date has been drawn up, along with an estimation of total costs up to the end of the project (see tables IV and V).

Taking into account slight overspends for training and equipment, and the costs to be incurred for the technical assistance missions in 1992, there is a positive balance of approximately 67,000 ECUs.

During the debriefing meeting, the Project Supervisor expressed the wish to spend this sum of money on an infra-red spectrophotometer.

As things stand, we do not feel this is a major necessity. In fact, it would be wise to ensure that all the project equipment is actually being used before purchasing more sophisticated equipment.

We also asked Mr. Standley to contact Brussels with a view to having the per diem allowance at Haikou increased (from 25 ECUs per day to 35 ECUs per day), so that the expert who has to stay there for several months can live in the town centre, which we feel is the least that can be expected.

Finally, we would point out that the per diem allowance accorded for Beijing (25 ECUs per day) is very low and does not cover actual hotel costs; its revision is essential. Who can live in Beijing on 25 ECUs per day?

TABLE IV

BUDGET IN ECUS
november 1991

	Planned	Realized by CEE	Realized by IRCA	Litigious	Difference	Planned still the end of the project
I. TRAINING	215 000					
I.1. Rubber special. 4 x 4 m		74 121.24	74 121.24	0		0
I.2. Senior staff 2 m x 2 years		111 985.33	111 985.33	0		0
I.3. Study tour		34 434.49	38 832.49	4 398 ^(a)		0
TOTAL	215 000	220 541.06	224 939.06	4 398	9 939.06	0
II. EQUIPMENT	300 000	303 664.00	(303 664.00)	0	3 664.00	0
III. TECHNICAL ASSISTANCE	270 000					
Administration of overseas training		2 903.00	3 588.00	685		
1st mission 10/87		21 167.00	22 493.00	1 326 ^(b)		
2nd mission 06/88		31 709.12	31 709.12	0		
3rd mission 10/88		29 483.23	31 922.23	2 439 ^(c)		
4th mission 04/89		0	2 788.00	2 788 ^(d)		
5th mission 04/90		24 169.89	25 783.89	1 614 ^(b)		
6th mission 08/90		19 731.26	18 778.26	47 ^(e)		
7th mission 10/90		26 102 ^(f)	26 102 ^(f)			
8th mission 11/90		22 904 ^(f)	22 904 ^(f)			
9th mission 11/91		15 000 ^(f)	15 000 ^(f)			
10th mission : analyse of samples, preparation of the mission, visit of Wallace, interlab. trials						9 000
11th mission : 2,5 m/m						30 000
12th mission : 2 m/m						26 000
13th mission : 1 m/m						15 000
14th mission : 2 x 0,5 m/m						20 000
Total	270 000	193 169.00	202 068.5	8 899	67 931.50	100 000
TOTAL	785 000	717 374.56	730 671.56	13 297		

(a) : Fee of the courier expert

(b) : air flight tickets

(c) : air flight tickets and really expenditures of M. Laigneau in Beijing for opening the bids document

(d) : certificate of the mission in Europe signed only by the Chinese Project Supervisor in November 12th, 1991

(e) : excess luggage

(f) : estimation

TABLE V

SUMMARY OF THE BUDGET IN ECUS
November 1991

	Planned	Realized by IRCA	Estimate expenditures still the end of the project	Balance
Training	215 000	224 939.06	-	- 9 939.06
Equipment	300 000	303 664 ^(a)	2 000	- 5 664.00
Technical assistance	270 000	202 068.5 ^(b)	100 000	- 32 068.50
Contingencies	115 000	-	-	+ 115 000.00
TOTAL	900 000	730 671.56	102 000	+ 67 328.44

(a) rediged by CEE

(b) estimate

VIII. DEBRIEFING MEETING

At 6 debriefing meetings, Mr. Zhang Xin Zhen, the Project Supervisor, described very positive results as regards the quality of rubber produced on the island of Hainan.

He mentioned:

- the setting down of analysis procedures in a manual available in each laboratory
- the introduction of sample cross-checking procedures
- that for off-latex grades, the amount of rubber sold as grade 5 has increased from 99.5% to 99.8%
- that for low grades, the amount of rubber sold as grade 10 has increased from 76% to 90.5%

This has enabled better valorization of the rubber produced on state farms and has provided an added value of 3.2 million Yuans per year.

The advice given by the IRCA experts is as follows:

- elimination of impurities in latex by decantation in the homogenization tank
- separation of low grades according to origin
- tapping in D3 rather than D2

The recommendations, such as they are described in this report, were commented on during this meeting, as were the technical assistance missions for 1992. They were favourably received by the Project Supervisor.

Finally, the Chinese officials insisted on three points that they find important:

- repairs to the 12 Bosch balances by a qualified technician
- the return to China of 2 students trained by the project: Messrs. Wu and Du
- publication of the project's financial situation in the mission report.

IX. OPERATIONS IN 1991

1991 was marked by the technical problem encountered with the Bosch balances, which the SIEMSEN company is to remedy by sending a Bosch technician.

In addition, following the conclusions of the two missions at the end of 1990, a meeting was held in Brussels to take stock of the project's operations and define the operations to be undertaken up to the end of the project. It was during that meeting that this mission was organized.

X. CONCLUSION

Unlike the conclusions of the last mission in 1990, we were able to see during this fortnight mission that the advice given during the technical assistance missions seems to have been applied in the factories and the equipment is now gradually being used in the factory laboratories to check production and thereby guarantee the quality of the rubber produced. This trend ought to be continued in 1992, through training operations and results analysis in the laboratories, so as to meet the targets set i.e. to improve the quality of rubber produced on the island of Hainan, by guaranteeing the quality, hence the consistency of the product's technological characteristics.

ANNEX

PICTURES

Coagulation tank



Press



Processing equipment

